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President's Report

President's Report
Tom McDermott, N5EG

Each year after HamCom, I come away from the event with renewed enthusiasm and vigor - and a long, long list of things to do. This year, it must be worse than ever. Apparently, some of our members feel the same, as they have taken upon themselves to work on numerous tasks. TPRS is truly fortunate to have such terrific volunteers. In this issue of the Quarterly Report, you can find discussions about APRS, minutes from HamCom, and the TAPR spread-spectrum radio.

First, HamCom had an increase in vendor attendance, although by the layout of the main exhibition area, it would seem that actually fewer vendors showed up this year. More vendors were arranged against the outside walls, leaving more room in the main exhibit hall. The Arlington convention center is being expanded, and a new main exhibition hall will be open in a few years that is larger than the current area. I guess this means that the flea market would be able to be expanded to about double its current size.

Greg Jones was able to take several digital pictures of

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TPRS
Quarterly Report

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HamCom this year, and if we're lucky, we'll put them in this issue of the Quarterly Report. Otherwise, be sure to check out our web site, www.tprs.org for the latest photos and news. All the news at HamCom was about Internet connections. Bob and Joe are working this out -- Bob on the technical portion and Joe on how to work with an ISP to provide the right kind of connectivity for a full-time network. Bob also talks in this issue about APRS, and how to he is upgrading TexNet to handle it.

The spread-spectrum radio project continues to be worked on. Sometimes it seems that progress is slow, but there's a lot of behind-the-scenes technical work occurring. Bob Stricklin has run a second turn of the digital board to clean up the white wires, and put the Ethernet interface down on the board. In parallel, I have been working on the port of the kernel and TCP/IP stack to the processor. As of this newsletter, Bob has the new board working much better than the old board, and I have the kernel and the drivers ported and running on a test board.

The kernel that we will use for the radio is XINU - which is a multi-tasking, pre-emptive kernel, with a full-blown TCP/IP stack. The initialization, serial, timer, and Ethernet drivers had to be completely re-written, and bits and pieces of the kernel adjusted to the 68360 processor. About two weeks ago we got the kernel up and running to the point that we can 'ping' it through the Ethernet port and it responds. Also, the console interface is operational, which means that we get something resembling a UNIX command prompt, and can launch outbound 'ping' requests, and look at the process status (ps) of all the tasks in the kernel. In addition, the kernel is routing packets, acting as a gateway. This means that we have on a 4" x 5" board in FLASH memory a complete TCP/IP router, gateway, and kernel. Also, there is SNMP (Simple Network Management Protocol) operating on the stack, but it has not yet been tested.

There are some problems with trying to get our spread-spectrum radio board operating on several

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of the different BDM development systems around, but it is working on one of them. The board has many different uses - one is the spread-spectrum radio, of course, but others could be as AX.25 encapsulation engines, as routers, etc. Many possibilities, but the reliability and stability of the stack must undergo a lot of testing first. Because of the low power consumption (less than 5 watts), small size, and temperature range of the board, we think that there will be a lot of demand for this 'Internet appliance' engine in unforeseen applications.

The ARRL/TAPR digital communications conference will be held near the end of September, in Chicago Ill. If you have the chance to attend, it's very much worth your time. Many of the latest and greatest new things in packet radio show up at the DCC 6-9 months ahead of when you read about them elsewhere.

With all the activities going on, there's not much time to write about everything, hopefully some of the activities will show up in the next few issues of the Quarterly Report. Although we have discussed much about the coming paradigm shift in amateur radio, over the next quarters there could be some demonstrations of what is about to take place. -30-

GENERAL MEETING OF TPRS, Sat June 6, 1998:

President Tom McDermott called the general membership meeting to order at 1210 hours at the designated place as scheduled during HamCom, in Arlington Texas. As provided in the bylaws, there was a quorum present.

Secretary Bob Morgan presented the minutes of the last meeting, and those of the last board meeting, as published in the August 1997 Quarterly report. A motion from the floor was made and seconded to accept both the minutes as published. Motion passed.

President Tom McDermott announced the next item as the election of two of the directors terms set to expire this year. These were the two year terms held by Joe Borovetz and Dave Wolf. Both these individuals had expressed a willingness to serve another term and were nominated to run. An additional nomination from the floor was made in the name of Mike Heskitt, who also agreed to serve if elected. A motion was made and seconded to close nominations. Motion passed. An election was then held, with those so nominated asked to leave the room while the polling was done. This was an election of the top two of the three candidates, each member allowed a vote for any two persons. Dave Wolf was elected outright, and a runoff was necessary to break a tie for the other position. The results of that runoff resulted in the election of Joe Borovetz. Therefore Dave Wolf and Joe Borovetz were declared elected for two year terms as directors of TPRS. These terms will expire in year 2000.

Treasurer Jim Neely was asked to present a Treasurer's report. Jim stated TPRS had a balance of somewhat over $3000.00 in the bank, with little activity. Expenses for a booth at HamCom and charges for printing and mailing the Quarterly Report were most of the total. Jim indicated a detailed report would be published.

Tom invited comments on the Quarterly Report from the members. He noted that due to a change in format and some cost cutting procedures, the cost had been cut to about half of what it had been. Brad Smith, the Quarterly Report editor, was introduced on the floor and complimented for the fine job.

Tom also complimented Frank Aguilar (who was not present this session) for the fine job as database manager.

Tom presented an award for service to Bob Morgan on behalf of the Board, which your truly wasn't aware of and caught completely off guard to the extent there was only a short acceptance speech.

Tom called for new business. No new business was presented with the exception of plans made for dinner that evening at On the Border. There being no further business, a motion was made and sec-

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onded to adjourn the meeting, which was passed, and the meeting was adjourned at 1222 hours. The dinner that evening surpassed all expectations, and overwhelmed the waiters with the attendance.

Robert B. Morgan WB5AOH
Secretary, Texas Packet Radio Society, Inc.

BOARD MEETING OF TPRS, June 7, 1998:

A board meeting had been scheduled for 10 AM at HamCom, announced to the directors the previous day. The board meeting was convened on Sunday, June 7, 1998, at approximately 1009 hours, in an (otherwise) empty meeting room at HamCom, in Arlington, Texas.

Members of the board present included Tom McDermott, Jim Neely, Joe Borovetz, and Bob Morgan. Mr. Wolf was absent. Greg Jones visited the meeting and contributed some ideas to the board.

Tom McDermott first introduced an election of the officers of the Society. A motion was made, and seconded, to retain the present slate of officers. That motion passed. The slate of officers is therefore as follows:

President: Tom McDermott
Vice President: Joe Borovetz
Secretary: Bob Morgan
Treasurer: Jim Neely

Tom then proceeded to state his approval with the work that Brad Smith was doing as editor of the Quarterly report, also with the job that Frank Aguilar was doing as membership database manager. He re-appointed both individuals to continue their fine work.

A discussion ensued on the goals for the following year. One of the long range goals of TPRS is to support whatever activity ensues as a result of the Spread Spectrum radio that TAPR is developing, however that wasn't projected to have much impact during the following business year of TPRS.

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Texas Packet Radio Society, Inc.

TPRS was founded in 1985 and is an educational, public service, and scientific research non-profit corporation. Texas Packet Radio Society goals are:

1- design and research amateur radio packet networks
2- provide education in the area of general packet usage

To accomplish better communications in the region, TPRS has been organizing statewide working groups to cover various networking topics. The current working groups are the Mailbox/BBS Group, TCP/IP Group, and the TexNet Support Group. TPRS hopes that these working groups will help promote information exchange in their respected areas in Texas. New working groups are formed as needed to provide channels for discussion and to help provide direction for that area of digital communications. Anyone can participate in a working group; TPRS membership is not required.

TexNet

TPRS has established a digital packet network protocol, a standard hardware package for the network nodes, and software modules that implement the TexNet network.

The basic design philosophy of TexNet is an open, inexpensive, multi-resource, high speed 'backbone' with access through multi-connect capable local nodes. On the high speed side, TexNet is a 9600 baud network system. For local access, compatibility with the typical 2 meter AX.25, 1200 baud, AFSK/FM station is the operational norm. Other baud rates and modulation techniques can be supported on the primary user port or secondary port. The system is totally compatible with both versions of the AX.25 protocol specifications for user connections. With these general specifications, TexNet has been designed and tested to enable all users to take advantage of this high speed, full protocol protected packet network system.

Each node offers, in addition to TexNet access, local area digipeater service, 2 conference bridges for full protocol protected roundtable or net operation, a full mult-connect, multi-user mailbox system, a local console for installation and maintenance setups, a debugger module for long distance and local software monitoring,and an interface for a weather information server for regional weather information, if available.

The NCP-PC (TexNet for PC) creates a direct interface to the PC platform. The Z80 based PC card supports 4 channels for communications. This co-processor approach allows the AX.25 and TexNet-IP to run on the card without affecting the PC. This allows the full power of the PC to be used for network applications. The versatility of this board is only now being developed and applications are endless.

The TexNet Network

The Texas TexNet network system has been operational since October 1986. When fully operational, the network reaches from the border of Mexico to Missouri. Use of the Texas TexNet system is open to all amateur operators. TPRS has been coordinating the installation of the Texas TexNet system. Further expansion of the system depends entirely upon the amateur community.

INFORMATION

TPRS is interested in spreading our information and research efforts as widely as possible. We want other groups involved with packet efforts to get in contact with us. We will provide information for those amateur packet groups that are interested in this system for their areas. If you would like more information concerning TPRS or TexNet, please drop a letter to:

Texas Packet Radio Society, Inc.
P. O. Box 50238
Denton, Texas 76206-0238

TPRS MEMBERSHIP

TPRS membership is widespread with most members located in Texas, but members are located in other states and in foreign countries. Membership is open to any interested person. If you are interested in becoming a member and receiving the TPRS Quaterly, please send your name, address and call with membership dues of $12 per year. A membership application is available elsewhere in this issue.

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An analysis of membership renewals was made. A discussion also took place regarding a $600 limit that Tom had concerning IRS tax liabilities of reimbursement of quarterly report expenses through his personal bank account, and there will be some alterations made to the process to allow the printing and postage expenses to be made independently of individuals accounts. Jim will make some arrangement to print and pay for the printing in Austin straight from the treasury.

A discussion of APRS activity and any support of it by TPRS ensued. APRS is sort of an independent movement (referred to by themselves as an enlightened anarchy), and TPRS will support it mainly by including articles and publicity. There will probably be a presentation on it at Summerfest. There will likely be some sort of support of networking of APRS through TexNet as code can be developed to that end. Some APRS code development in TexNet, however incomplete, has been done. Mike Heskitt was invited to assist and coordinate some of the things that TPRS would be doing to support APRS.

A discussion took place regarding AMPR IP address coordination and what if anything TPRS ought to have to do with it, which is nothing at present. It was decided to leave that situation as it is now.

The topic of the TPRS internet site domain name (tprs.org) was raised. Jim stated he had paid the annual fee for re-registering the domain name, and redirected further billings to the P.O. Box. It was decided to not make any expenditures for registering any addresses at the present time. It was noted that any activity used to support TexNet encapsulation through the internet would be done with various hard-coded numerical address routing at diverse locations and didn't depend on domain names or nameservers for operation.

A discussion ensued regarding anything that TPRS might need to do to coordinate or network regional spread spectrum activity when the time comes in a year or so. We will probably have to wait another year to do anything specific. A network name on the order of TexNet-II was proposed for the anticipated network. We decided to assist with training, publicity, demos of applications and similar things when the need became apparent and the opportunities presented themselves, and to otherwise retain a low profile until the time was right.

A discussion of the future of TexNet trunking through the internet took place. WU3V in Louisiana has successfully networked the internet DX cluster activity, and I have been having technical discussions with him on the subject, and I am to proceed to continue working out details with him as needed, and to bring up some internet trunking as the situation allows to happen.

A motion was made and seconded for adjournment. The motion passed and the meeting adjourned at 1041 hours.

Robert B. Morgan WB5AOH
Secretary, Texas Packet Radio Society, Inc.

TPRS WEB Site - From Dave Wolf, WO5H

It's a real pleasure to be able to contribute a little to the organization through maintaining the web site. Is there anything that would benefit the group that you would like to see added that would not overlap with services provided elsewhere?

If your ham group has a web page, or you have an individual page devoted to an aspect of ham radio, we would be happy to swap links with you. Just drop a note to wo5h@tapr.org and I'll add your ham radio-related site at the next opportunity.

One thing we could really use some help with: an updated BBS roster. Our list is quite out of date. We need to hear from BBS sysops! We're talking full-service bulletin board systems, not mailboxes, please. If you see a station on the list that has been off the air for eons, please let us know, too!

One other solicitation: do you have some late-breaking ham-related news story to share with others? Please forward this to Tom McDermott, n5eg@tapr.org.

Permanent Internet Connection utilizing Spread-Spectrum Radios.

Joe Borovetz, WA5VMS

[Editor's note: Joe is working on providing Texnet connectivity into Muskogee, OK. His plan is to utilize the Internet to link his Texnet node to other Texnet equipment that is going to be also linked to the Internet. The problem he needed to solve was to acquire a full-time, always-on Internet connection. Joe is experimenting with a 2.4 Ghz. spread-spectrum radio as the permanent link between his QTH and the Internet Service Provider's (ISP's) office. The Texnet node will be located at this house. This article is part 1 of how he has accomplished this.]

Over the past couple of months, I have been contacting Internet providers in the Muskogee, OK area. The idea has been to obtain a 24 hour per day "wireless" connection to the Internet. This connection would be primarily for Amateur radio use with personal Internet access thrown in for good measure. In this issue of the Quarterly Report, I will cover some of the basic steps that I went through in order to obtain such access. In future issues, I will go into further detail and describe the complete equipment setup and some additional issue that need to be addressed when dealing with ISP's.

To start off with, I will give a bit of background on the three local ISP's. There are some smaller companies but for the purposes of this discussion, I will stick with the three major players. I will call them A, B and C for the order in which they started up in business. Muskogee is located about 45 miles Southeast of Tulsa, OK . Until January of 1996, there was no local access number for Internet access. A long distance call to Tulsa was required. ISP " A" opened up for business and I established my account with them. In December of 1996, ISP " A" changed owners. I found out later that before the change in ownership, ISP " A" was close to being out of business.

ISP "B "opened in the spring of 1996. " B " was not my choice for an ISP since they started out by featuring a local chat room that you could log into. This meant that a great number of the access lines were tied up by the school kids, all of whom were logged into the chat room. In the beginning there were a lot of busy signals when trying to connect.

ISP "C" opened in February of 1998. This company was started by several local business people who were upset with the quality of service that they were receiving from the other two companies. They had a few initial problems, but since then they have been quick to address the needs of their customers. I like a company who monitors the status of their equipment and orders additional phone line when they detect that their subscribers are encountering busy signals.

Now that I have covered the background information, on to the subject of establishing the wireless connection. First of all, I need to cover the reasons for ruling out ISP "A". "A" is located on the seventh floor of the First National Bank building in downtown Muskogee. The bank building was at one time a famous hotel that was converted to office space in order to save the building. This building is on the National Register of Historic Places. For this reason, roof access is all but impossible to obtain.

Over the years, there have been many places where leased lines were available to expand Texnet. Unfortunately, these circuits were of little use. The problem is that the circuit was in a building where roof rights were not available. Free circuits are of no use if you cannot get the feed out of the building.

On a personal note I found the new owners at one ISP to sometimes be difficult to deal with, my concern was about full-time access. I know of some folks who told me that they received letters telling them that they were on line too long and if this continued, they would be charged a higher rate. This from a company that advertises unlimited access for $19.95 per month.

I began my search for a wireless connection with another ISP. As I stated earlier, my main objection to them was the number of busy signals. They fit my criteria for a wireless link. It was within range of

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the 2.4 GHz Spread Spectrum modems that I would be using and I had roof rights on a building right next to this ISP. At first, they did not seem to have a problem with what I was trying to do. After dealing with the head tech for about 30 days, I decided that I was wasting my time. I found out that I was not the problem or my plans were not an issue, it seems that this fellow has a habit of procrastinating. If you look at their operation, it is a bit of a mess, computers lying around all over the place, covers off, hard drives not mounted in drive bays. They have not updated to the newer technology, they are still using racks of 33.6 modems.

Next stop, an ISP called Net1 (www.oknet1.net). I gave James (the head tech) a bit of background info on TPRS, TAPR and what I was trying to accomplish. Net 1 was not my preferred choice. This was not from a business standpoint, it had to do with location and antenna considerations. I wish that I had started with Net1 in the beginning. Net 1 is located in what was at one time a convenience store. They have one third of the building and Domino's Pizza has the other two thirds. The manager of Domino's is the building owner. Net 1 is closer to my home QTH. That is a plus, on the minus side it would be necessary for me to put up an antenna structure.

Net1 is very well managed. James is a great person to do business with and he is open to new and "neat" ideas. He was ready and willing to work with me on this project. He obtained the clearances from the building owner that will allow me to erect a 50 foot tower for use with this link. As I side note, I guess it does not hurt that I buy pizzas from Domino's on a regular basis. (Gee isn't pepperoni one of the four basic food groups). I have received donations of a 50 foot self-supporting aluminum tower. This was a BIG help. Thanks to Bob Buford, KD5QD for this.

Before I close the discussion for this issue of the Q-Report, I need to cover a few basic points. I NEVER went to these people with the idea of getting free service. I always indicated my willingness to pay. I DID ask for, and received, a price break based on the fact that I was not tying up one of their phone lines. You might say that under those circumstances, they should give you a REAL price break , like almost for free. Not so. James tells me that they figure that each dedicated IP address is worth about eight customers. Net1's normal charge for each dedicated IP address is about five dollars per month. In many other areas, this charge could be considerably higher. He is giving me a break on this one by supplying one address for free.

The next issue is bandwidth. An ISP has to pay for bandwidth and they cannot afford to give it away and then stay in business. Based on my requirements for packet links, email and my normal web browsing, my rate for 169K access will be about forty dollars per month. When I factor in my current access charge of $19.95 per month plus the cost of a dedicated phone line for modem use, I end up saving money. The "luxury" tax on my second phone line makes having the second line a luxury. This tax is mandated by the FCC, SW Bell has no control over this one.

Another important issue: I will not re-sell or "give away" full Internet access as a result of this feed. Any web browsing that is done on this feed must be limited to my personal use.

Last but not least, remember this: Yes sir, you are the boss, whatever you say sir. When you ask permission to install equipment on someone else's property, they are the ones in charge. If you do not feel that you can abide by their wishes, then by all means look for another provider. Too many times, amateur operators forget this and rush right into a project, determined to do it "our" way. If we do it "our way", we can end up creating hard feelings and giving amateur radio a bad name.

I think that is all I have room for in this issue of the Q-Report. Next time, some of the hardware issues involved in this project.

— Joe

APRS Networking on TexNet
Bob Morgan, WB5AOH

This summer, a revolutionary addition to the TexNet firmware took place, which added networking support for APRS.

What is APRS? APRS or Amateur Position Reporting System (I think that is close, anyhow) is a packet protocol and software system which basically integrates the GPS system with Amateur Packet Radio systems. Essentially it falls into the category of computer systems known as GIS, or Geographic Information Systems. These systems combine geographic computer mapping displays with our packet communications to perform location functions for amateur radio (primarily mobiles), and other things related to either mobile operation, radiolocation, weather spotting, or location of other known or searched-for objects that we come into contact with. In its simplest form, a GPS receiver mounted on a mobile or portable station is periodically transmitting its current coordinates over packet radio to the world of APRS packet receiving stations which are equipped with the mapping software, and of course maps covering the area of interest. The mobiles or portables display on the screen map as a symbol (and callsign) showing a near real time location. Other information can be shown also. Course and speed, and optional dead reckoning estimates of position are the most common auxilliary data. Other incidental information is varied across the spectrum of Amateur radio activities. Weather and storm spotting is one obvious application. Radiolocation of transmitters is another application, such as a foxhunt or intruder hunt. Telemetry is another. Mobiles and portables can include bicycles, runners, small airplanes and high altitude balloons, in fact anything on which a portable amateur radio station can be mounted.

So what does this have to do with TexNet? Previously, nothing. APRS uses a subset of packet data transmission protocol known as the UI frame (unnumbered infomation). That is sometimes known as un-connected mode. A sender just squirts out a data packet, to whoever is listening and can copy it. It isn't part of a connection between two participating stations. Since it isn't a connected mode packet, it isn't acknowledged, whether or not it has been successfully received anyplace. They can be easily digipeated, if the packets contain digipeater addresses. But TexNet is a connected-mode environment. Unconnected or un-numbered frames aren't a part of the network environment, other than for the periodic ID frame that the nodes send out every 8 minutes. You just can't send a UI frame to TexNet and expect it to do anything with it, except maybe to digipeat it locally at the node that hears it. Now that has changed, to allow APRS UI packets to be sent over TexNet, with the purpose in mind that they will be retransmitted by other nodes in other cities, very possibly at multiple locations.

So why would we want to make TexNet have anything to do with APRS? APRS wants to expand its coverage area as wide as it can. In fact, one of the newer "generic" digipeat addresses that turned up in connection with APRS is itself the simple address "WIDE". "RELAY" is another, meaning that it might be a lower coverage digipeater used to get to the nearest "WIDE" coverage digipeater. But when it came to the network that spans several hundred miles of several hundreds of miles and miles, nothing happened. We might want APRS packets that are relevant to NWS or SKYWARN activities to turn up at the weather offices, for instance, and possibly at several regional offices. A mobile based in the Dallas/Ft Worth area, for instance, might want to travel to San Antonio or maybe even Brownsville, with his mobile APRS tracker transmitting his location back to his buddies and family at home. In a very real case, we might want to watch the location of a Civil Air Patrol plane on a search mission (more on this story later), and display it in real time at several EOC's across the state, as the search area expanded over a sizeable area of Texas. And of course, hams like to experiment and try new things. APRS is also suited to do some of the display activities of a network manager, such as to capture telemetry and network statistics, and graphically display them, although this is still a pipe dream right now. Maybe an amateur is doing some testing on his packet station, like setting frequency

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and deviation without the benefits of test equipment. He might one day be able to send a test packet, watch his own display on APRS either listening to the radio, or maybe one day watching the live TexNet display on the TPRS website, displaying the frequency and deviation of his last packets, and readjust his TNC transmitter until he got it set OK. That little pipe dream is already in the planning stages now. Remote telemetry is possible from remote weather stations, remotely located repeaters and packet nodes, and is displayable with APRS.

So what has been added to TexNet, and where? Mostly software, but also needed in most locations are additional modems, radios and antennas, since APRS activity takes place on other packet channels that the connected mode packet activities don't use. The conventionally agreed-on APRS frequency has in recent months been changed from 145.79 MHz to 144.39 MHz in most places that TexNet is relevant to, although that isn't universal quite yet, and other frequencies are in use. For instance in west Texas where they use whatever they have that works, since activity is sparse and there are more miles to cover with fewer resources. Version 1.75 of TexNet firmware, which at this time of writing is still undergoing betatesting and repeated tweaking, now speaks APRS. It is installed on a few nodes in Austin and Waco, and earlier beta versions that don't speak ARPS are currently testing in San Antonio, Corpus, and Rockport. The actual end-to-end tests of APRS networking over TexNet have taken place between Austin and Waco, primarily because these sites were easily accessible for experimentation. Over the next few fall months, we hope to add APRS ports on 144.39 to several nodes in Texas, hopefully linking D/FW, Waco, Austin and San Antonio metropolitan areas. A brand new node is under construction in Austin, and it will have an APRS port, and probably a DGPS beacon. (DGPS is a system of increasing the precision of the GPS location fix by transmitting error data from a fixed, precisely known location, and is a corrective input to a field GPS receiver's calculations).

So what happens when an APRS packet comes along and encounters a TexNet node? First off, it MUST be a UI type packet, no others will do. A connected mode packet must use the conventional means of accessing TexNet that we all know about over the years. Secondly, it MUST contain a digipeat address that the TexNet node recognizes as a match. If those conditions are met, it of course will digipeat (so locals can see it), and then it will be examined further to see if it meets network criteria. APRS functions are in general recognized and controlled by the destination or "TO" address, for instance "APRS" or something similar. Others might be DGPS, SKYWRN or the like. A portion of the node's routing table has been partitioned off internally to the node, and the last ten slots of that table (now no longer conventional node routes) are used to compare APRS "TO" addresses. If a match is found in the table, up to 5 nodes could have been pre-arranged as destinations for APRS packets arriving at the source node. For instance, the node in WACO might be set up ahead of time to accept packets for APRS and send copies to Austin, Dallas, and San Antonio. It might also accept SKYWRN packets for Fort Worth and New Braunfels, where NWS offices are located. When the packets arrive at individual destinations, a local node parameter is used to determine which port of the node to send it on, so that it will transmit on the local APRS channel instead of the BBS or DXC channel, for instance. At this point it will have been doctored up with some other "used up" digipeat addresses, namely the callsigns of the TexNet nodes that originated and finally delivered it. So we have a record of where that packet entered and left the system. It won't be an exact reverse route, but it does have some partial tracing data, and also very importantly, can't be digipeated again to make an undesired infinite loop. There might be a need for further digipeat addresses through specific digipeaters on the destination end. For now, that isn't possible, mainly to avoid loops, but it will be considered on a future revision.

There are a few other minor details to note along

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the way. First off, there is a limit of a maximum of 218 bytes that TexNet will transport in an APRS packet. I haven't ever seen an APRS packet even half that long, so I doubt that will ever be a problem, but that is the max data length that is acceptable since there is some overhead on the network. Longer packets are chopped off, but are sent. The PID byte (protocol-ID) of the sender's packet IS preserved during transport, although I don't think that anything other than xF0 is ever used. Most critical to note is that TexNet is treating APRS packets like space-available passengers on an airline. They are traveling second class, and they can get bumped if the source node or some node along the way is congested and has a backlog of connected mode traffic to send to the next node. Right now, that backlog is hard-coded at 30 packets, for any one trunk path to some next node in a chain of routing. If it gets bumped, it goes into the big bit bucket and that'sthe end of it as far as TexNet is concerned.

Keep in mind that APRS packets are UI's, because APRS is a broadcast, or one-to-many protocol and system. There aren't any layer two acknowledgements, they just get in the way. If a collision occurs, the packets that collide are both history, they don't make it through to destination(s). So how does APRS perform its intended job of delivering data if it uses a basically unreliable delivery mechanism? Well it is called statistical oversampling. There are some basic timers built into APRS itself, mostly the refresh rates of the senders, and the display grey-out timers of the receivers. If we transmit our new, and of course updated, data every 10 minutes, or maybe every minute for a mobile at highway or aircraft speeds, and we hold information on the display screen for 20 minutes, then usually we won't miss much. Yes, we may miss individual pieces of data, but as they become older they also become more irrelevant. As newer, more relevant data does make its way through the air, it displays updates. If we strive to get 50% of our 10 minute samples through, we ought to keep that 20 minute display on the screen continuously. So it goes on the packets delivered over the network. They of course arrive as UI's at some source node, if they don't get clobbered up to that point, either by noise or by collisions. If they are accepted by the network APRS destination filter rules, they are sent over the trunk as connected mode traffic, just like any other trunk traffic. Provide that the nodes enroute aren't congested with a packet backlog, the network will either deliver the packet to the next node or kill its trunk connection attempting to forward it, just like it does with other network traffic. If it does encounter congestion, it will drop that packet and not further add to that congestion or interfere with other traffic on the trunks. That has been pretty well tested in practice, as the Austin-Moody path is subject to severe congestion, we think induced by poor propagation. Believe me, at 30 packets of backlog, the APRS forwarding shuts down, as intended.

Now, a few other tidbits. The destination lists are manually managed by a network sysop, who must decide where which APRS packets need to be sent from any node to any other node. There aren't enough network resources to rebroadcast them to all other nodes. APRS on TexNet will be a regionally-centered system. That means that we will forward most packets to maybe 3 or 5 other nodes. We COULD send them to a theoretical 50 nodes, since there are 10 table slots of 5 nodes each, if we were able to fan them out several ways at the first node, so that we didn't hit the 30-packet backlog on a common outbound circuit. If we were at the end of a network segment, we would have to be content with absolutely 30 simultaneous destinations, and practically more like 20 or 25, since packets may be stacked up 5 or 10 deep due to normal network operations, and when the limit of 30 packets is reached by any means, including suddenly queueing up 30 APRS packets, it will choke and dump the remainder right then. So we will have some reasonable, regional limits for destinations, and it will be oriented to some subset of the regional network, probably nodes that are within 2 to 5 hops. This is a manually managed system. The destination tables may get destroyed at any node when it gets a reset. TexNet automatically re-maps the basic network trunking when resets occur, but there aren't any mechanisms for determining what APRS packets ought to be sent to which externally oriented destinations on the network.

continued next issue

HAM COM '98

Above, N0CCW. Below, WB5QLD

Outstanding Achievement Award

TPRS expresses its gratitude to Robert Morgan, WB5AOH (right), in recognition of outstanding technical contributions to the Texas Packet Radio Society. Your dedication, effort and perseverance, including TexNet code, node, and Internet developments have been instrumental to the goals and furherance of the society. (Tom McDermott, N5EG, left)

June 6, 1998
Arlington, Texas

WA5ZAI and WO5H

TPRS Node Assigments
Official Publication: June, 1995
Subject to Corrections/Additions/Deletions.

X = ACTIVE/COMPLETED
T = ACTIVE/TEST
P = PENDING

Nr	Status	City/Town	Alias	Call	User Port	Remarks
1	X	Dallas	TEXNET	WR5C	145.05	PMS
2	T	Richardson	TESTBED	W9DDD	None	R&D
3	T	Richardson	RICH	W9DDD	None	R&D
4	X	Murphy	MURPHY	N5EG	145.09	
5	X	Ft. Worth	NWS	N5HCO	None	Weather PMS
6						
7	P	Beorne	BEORNE	N5VUO	145.01	(Bridged w/BNE THENET)
8	X	Geronimo	GERONMO	WB5NSN	145.07	PMS (AKA GERLNK)
9	X	Austin	AUSTIN	WA5LHS	145.07	
10	T	Austin	NQ9Q	Bryan Stroud Test Node		
11	X	San Antonio	ALAMO	N0CCW	145.09/223.44	
12	X	San Antonio	SALAMO	WA2MCT	Interface to SNS/NO USER PORT	
13	X	Denton	DENTON	W5NGU	145.03	
14	X	Lubbock	LUBBOCK	W5ERO	145.05	
15	X	Midland	MIDLAND	WB5RXA	145.05	
16	X	Greenville	GREENVL	WB5IZL	145.07	
17	X	Midland	MAFDXC	WF5E	223.58	DXCluster port 2
18	T	Austin	NQ9Q	Bryan Stroud Test Node		
19	X	Rockport	ROCPRT	N5JKH	144.99/PORT 2 446.1	
20	X	C. Christi	CORPUS	N5XCH	145.05	INTERFACE TO SNS
21	X	Pettus	PETTUS	KA5BWL	147.56	
22	T	Corpus	ESTES	KB5GD	None	Test Node
23	X	Lubbock	LBBDXC	KA5EJX	DXCLUSTER	
24	X	Austin	AUSDXC	WB5VZL	144.99	
25	P	Corpus Ch	CCSU	N5AHD	TEXT Node	
26	X	Victoria	VCTRIA	W5DSC	145.01	
27	X	Alice	ALICE	K5DYY	145.07	
28	X	Amarillo	AMARILO	WD5ILA	145.05	
29	X	Abilene	ABILENE	WB5EKW	145.05	
30						
31	P	Houston	HOUSTON	WD5HJP	UNKN	Due ???
32	P	Pearland	PEARL	UNKN	UNKN	Due ???
33	P	Rosenburg	ROSBRG	UNKN	UNKN	Due ???
34	X	San Antonio	SANTEX	WB5FNZ	223.58	
40	P	Hempstead	HMPSTD			Due ???
41						
42	X	Kingsville	TAMUK	W5ZD	144.91	(aka KINGVL)
43	P	Bryan/CollStn	SBRAZOS	KF5LN	145.05/446.10	Port 0 (PENDING RE-INSTALLATION)
44	P	Bryan/CollStn	NBRAZOS	KG5ZD	446.1	(See Nr 43)
45	X	Fannin County	FANNIN	WB5RDD	145.05	
46	X	Sherman	SHERMAN	WB5CVR	144.93	
47	X	South Dallas	SDALLAS	KF5RN	None	
48	X	Waco	WACO	WD5KAL	145.09	
49	X	Falfurrias	FALFUR	WB5FRO	None	

50	X	Mercedes	VALLEY	NA5C	144.60	DXCluster port 2
51	X	San Isidro	ISIDRO	K5RAV	None	
52	P	Brownsville	BROWX	K5RAV-?	NWS node 25.54.57N 97.25.08W	
73	X	Fort Worth	FTWORTH	N5AUX	144.99	
80	T	AOHTST	AUSTIN	WB5AOH	NONE	R&D AUSTIN
98	X	Murphy	CARDNAL	WA6ROC	None	R&D/PMS/NMS/NETCON

(100-150) Reserved for TexLink Node Usage

105	X	Floresville	FLORES	WD5DOE	None
106					
107	X	King Mountain	KINGLNK	WB5YHC	145.05
108	X	Alpine	ALPINE	WA5ROE	145.05
109	X	Refugio	REFUGIO	WB5OLT	None
110	X	San Angelo	ANGELO	WA5JSN	145.05
111					
112	P	PLAINVIEW	PLVLNK	KC5ALN	145.05
113					
114		Reserved - WB5DDP			
115		Reserved - WB5DDP			
116					
118		Moody	MOODY	W5ZDN	None
119					
120					
121					
122					

(151-249) Reserved for Non-Texas Node Usage

160	X	Ft Gibson OK	FTGIBSN	N5GIT	145.01	
161	X	Muskogee OK	MKOTST	WA5VMS	446.5	PMS
162	X	Muskogee OK	MUSKOGE	W5EJK	145.09	
163						
164	X	Lincoln AR	FAYETVL	K5VR	145.69	
165	X	Clayton OK	CLAYTON	W5CUQ	145.03	
166	X	Ft Smith AR	FTSMITH	W5ANR	144.91	
167						
169	X	Tulsa OK	TULWX	N5WX	NWS WX Server	
172	X	Okemah OK	OKEMAH	WB5HLR	145.69	
173	X	Choctaw OK	CHOCTAW	AB5H	145.69	
174						
175	X	Garfield AR	GARFLD	WB2ROC	None	
176	X	Aurora Missouri	OARSMO	K0SQS	145.05	
177	X	Mt Magazine AR	MAGAZIN	KF5XB	144.95	
178	X	Russelville	RSLVL	WB5BHS	UNKN	
179	X	Little Rock AR	LROCK	WB5SQK	144.97	PORT 2 446.50(FUTURE)
209	T	Little Rock AR	LRTST	KA5SQK	TEST Node	

(250-255) Network Reserve

If you are a TexNet node opearator/owner and have a correction to make to the list, advise to N0CCW@K3WGF.#STX.TX.USA.NOAM, or leave a message for N0CCW on the NDALLAS PMS of TexNet.

TPRS Membership Application

Name ______________________________ Callsign _______________
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Evening Phone (   ) __________ Work Phone (   ) _____________

Membership is $12 per year. How many years are you paying for? ____

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HAM COM 98

Pictures

Inside

Be sure to visit the TPRS web page:
http://www.tprs.org
for the latest information on TPRS activities.

A current listing of Packet nodes, frequencies, and networks is located in the **North American Digital Systems Directory (NADSD) on-line at:**
http://www.tapr.org/directory/index.html

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